# Crystal Tester

## 015

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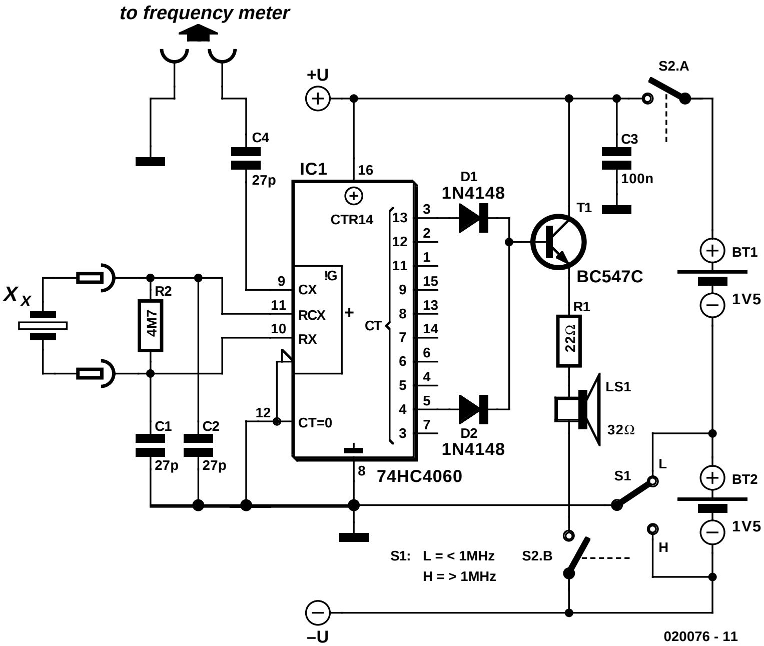
This general-purpose crystal tester can be used to test and measure quartz crystals having frequencies from 30 kHz to 100 MHz. It is suitable for use as a front-end accessory for a frequency counter to directly measure the frequencies of fundamental-mode crystals up to approximately 24 MHz. For overtone crystals, however, only the fundamental frequency can be measured. For example, the counter will indicate a frequency of 20 MHz for a 5th-overtone crystal that oscillates at 100 MHz.



This behaviour of the crystal tester is due to the supply-voltage dependent maximum operating frequency of the HC logic family, among other things. At room temperature, a maximum clock rate of around 30 MHz (with a 3-V supply voltage) can be expected. For crystals with frequencies lower than 1 MHz, a 1.5-V supply voltage (switch S1 set to 'L') is fully adequate, so measurements can be made in this region using especially little power. For higher-frequency crystals, S1 is set to the 'H' position, for which the maximum frequency is significantly higher.

The principal component of the tester is a type 4060 14-stage counter. The crystal to be measured is connected to the input of the counter chain, but the signal exits the counter IC directly (buffered and inverted) in the direction of a frequency counter. The counter IC is only used to divide the crystal frequency down to a frequency in the audible range. The two diode-ORed counter outputs divide the crystal frequency by 32 (Q5) and 16384 (Q3), respectively. If the crystal oscillates, the resulting frequency is made clearly audible by a 32-Ω miniature speaker.

The current consumption depends primarily on the speaker and is around 25 will also be rewarded by reduced current consumption. The most economical operation is achieved by dispensing with the speaker and using the circuit only as a front-end accessory for a frequency counter.

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